

FLYING LESSONS for December 23, 2010

suggested by this week's aircraft mishap reports

FLYING LESSONS uses the past week's mishap reports to consider what *might* have contributed to accidents, so you can make better decisions if you face similar circumstances. In almost all cases design characteristics of a specific make and model airplane have little direct bearing on the possible causes of aircraft accidents, so apply these *FLYING LESSONS* to any airplane you fly. Verify all technical information before applying it to your aircraft or operation, with manufacturers' data and recommendations taking precedence. You are pilot in command, and are ultimately responsible for the decisions you make.

If you wish to receive the free, expanded *FLYING LESSONS* report each week, email "subscribe" to mastery.flight.training@cox.net.

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Merry Christmas to all who observe the season, and safe flying and a very happy and prosperous New Year to all!

This week's lessons:

Going off the end of the runway is usually the result of excessive speed on final approach. As a rule of thumb, for every 5% of extra airspeed over "book" final approach speed you're flying when over the runway threshold, you'll increase your landing distance by 10%.

Carrying extra power to "cushion" your touchdown may make for a smoother arrival, but book landing distances are usually computed assuming flight-idle power "over the numbers." Extra power on landing can dramatically increase your landing distance.

Compare the computed landing distance from your Pilot's Operating Handbook to the performance you actually get at the speed you fly, then fly the speeds and power settings from the POH and see how close you can actually get to book distances. This might be an excellent exercise for your next dual instructional session or Flight Review, with an instructor current and expert in the type of airplane you fly.

Poor glidepath management is another common contributor to runway overruns. Your glidepath should take you to the touchdown zone, which on an IFR runway is usually 1000 feet from the runway threshold or one-third the total runway distance, whichever is less. Visual glidepaths (VASI, PAPI, etc.) are typically aligned to take you to this same touchdown zone as well, although they may be set differently by airport management or the field's owners (check the *Airport Facilities Directory* or your country's equivalent for any notes about a visual glidepath and the touchdown zone).

If the runway is wet, hydroplaning may also contribute to excursions off the runway's far end. Hydroplaning occurs when a thin film of water builds between a tire and the surface, and actually lifts it from the runway. Tires are no longer in contact with the ground; braking loses its effectiveness, and you may not be able to brake or steer the airplane.

NASA studies show that hydroplaning can occur in as little as one-tenth inch of water. The speed at which an airplane tire hydroplanes is a direction function of the tire pressure. The National Aeronautics and Space Administration (NASA) identifies the hydroplaning critical speed as nine times the square root of the tire pressure. This means most light airplanes can hydroplane at as low as 50 knots.

Note the main wheel tire pressure for the airplane you're flying, and compare that pressure to the touchdown speed (which should be very close to the stalling speed as adjusted for airplane weight). You may find that your normal landing puts you close to a hydroplaning speed. For example, the Beech A36 Bonanzas I usually fly have a nominal main gear tire pressure of 33 to 40 psi. At light weights, such as at the end of a trip, the computed stalling speed is 52 knots.

TIRE PRESSURE (psi)	HYDROPLANING SPEED (kts)
30	49
40	57
50	64
60	70
70	75
80	81

(above) Tire Pressure versus Hydroplaning Speed (NASA)

What's this mean? It's imperative to slow down to land on a wet runway. If I land even a little bit faster than "book" I may have reduced (or no) braking ability. The same may apply to the airplane you fly.

The late aviation legend Sparky Imeson gave us techniques to avoid hydroplaning when landing on a wet runway:

- Touch down as close to the approach end of the runway as possible, to maximize available landing distance.
- Plan a firm arrival, to put the tires solidly against the pavement.
- Lower the nose wheel as soon as possible to maximize steering capability.
- Avoid applying brakes at or above the NASA critical speed for your airplane.
- Retract flaps to put more weight on the wheels, increasing directional control (Note: attempting to retract flaps during the landing roll is a common cause of inadvertent landing gear retraction in retractable-gear airplanes...so be careful--tt).
- Divert to a more suitable airport if a wet runway is combined with a crosswind.

Comments? Questions? Tell us what you think at mastery.flight.training@cox.net.

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Debrief: Readers write about recent *FLYING LESSONS*:

Aerobatics instructor Tony Johnstone writes about last week's *FLYING LESSONS*, which mentioned evaluating the risk of short-field operations:

Excellent newsletter (as always). One of your comments on test flying regarding short-field operations piqued my interest.

Short-field takeoffs seem to be anxiety-provoking in many pilots at a variety of experience levels. There is something about seeing the end of that runway approaching, especially with an obstacle, that induces an attempt to horse the airplane off the ground before it is ready to fly. Particularly in a tailwheel airplane, getting up onto the main gear, and then raising the nose will increase drag and actually lengthen the ground roll substantially. Similarly in a tricycle [gear airplane], raising the nose too high too early will do the same thing. I try to teach my tailwheel students to find the "sweet spot" where the airplane generates the least drag and accelerates most efficiently, just a couple of degrees difference in pitch attitude will result in acceleration that feels like somebody just pulled a rug out from under the airplane! The key is to let the airplane accelerate to the proper liftoff speed, then rotate, [which is] sometimes difficult to get your mind around when you are racing toward the trees.

You have to discipline yourself not to pull it off too soon. More than one pilot has come to grief yanking the airplane off into ground effect at a speed that would not allow him to climb out of it!

Excellent observation and reminder, Tony. Thanks.

Several readers comments about the reality that most airplane owners (and sometimes even renters) act as “test pilot” when an airplane is returned to service after inspection, maintenance, modification or repair. Here’s what some of you wrote:

Reader Charles Lloyd summed it up:

Your *LESSON* about return to service is something that will catch most pilots off guard.

Indeed it probably does, Charles (We’ll hear more about Charles in a moment). Karl Fischer writes:

Without repeating any of your words, the ‘Test Flight’ shall be made as you stated, but with the chief [of maintenance] or actual mechanic sitting in the RIGHT SEAT doing the evaluation and recording. [It’s] part of the contracted work transaction ... at least in our aircraft! You can and should be a diligent owner and operator, but, if you are not a mechanic, don’t pretend you are!

That’s right, Karl...but relatively few shops have the staffing for it. If it’s important to you, it’s best to ask before you commit to using a specific facility.

There’s an insurance aspect for airplane owners, also, if you find a shop that *will* conduct a post-maintenance test flight for you, or fly your airplane for any reason in the course of providing mechanical services. Check the Approved Pilots section of your insurance contract. It will identify persons who may fly the airplane that make the policy valid:

- **Named pilots.** Persons who, by name, are listed as approved under the policy. This usually includes the owner(s) and sometimes others who the owners have added for some reason.
- **Open Pilot Warranty (OPW) pilots.** The OPW is a minimum set of pilot qualifications that, if met by the pilot-in-command, keep the policy in force. A pilot who meets the OPW does not need to be named to the policy for the insurance contract to remain valid.
- **FAA Repair Station employees.** Of course this section is not applicable to non-US readers. By US-based policies often provide coverage when a shop flies the airplane as part of maintenance or inspection services, even if the pilot does not meet the OPW and is not specifically named to the policy. The idea is to provide some flexibility for shops to test-fly an airplane (if they’ll do it) when their pilot (often the mechanic) does not have a lot of time in the specific airplane type.

There are a couple of “gotchas” here, though. First, the maintenance facility has to be certificated as an FAA Repair Station. Not all maintenance facilities, even some of the very good, well known ones, have an FAA Repair Station certificate. Second, the pilot has to be an *employee* of the repair station. A local airplane pilot or CFI who does maintenance test hops as an independent contractor might not meet the requirements of your insurance coverage.

Again, if you have a maintenance provider who is willing to make a test flight after completing work, it’s best if you have determined who that pilot will be, and whether he/she meets your insurance requirements, before authorizing the flight.

2009 National FAA Safety Team Representative of the Year (and *FLYING LESSONS* reader) Kent Lewis continues the topic by suggesting:

We could start a thread entitled "You're a Test Pilot When..."

1. You are operating at the edge of any performance chart, or at least you better fly like the test pilot did when validating the chart! Example: Flying at the "Demonstrated" crosswind limits of an airplane, computing landing distance for contaminated runways, or both.
2. Dealing with a compound emergency, which has no checklist.
3. ??? (send your ideas to mastery.flight.training@cox.net).

There is always a good discussion on the condition of the airplane in which the factory test pilot conducted the testing [compared to] the airplane we are flying, plus the skill of the test pilot versus our skill and proficiency level. Test pilots go out with a scripted test card, they know exactly what conditions (aircraft, environment) they are getting into, they are current, proficient and have a well maintained airplane with a pocket full of resources and a flight test support team. They also don't create dynamic, compound emergencies for themselves by flying fatigued into bad weather with poor flight planning information.

Reader Richard Graham (a former SR-71 pilot) suggests this advice about a post-maintenance test flight:

After reading last week's *FLYING LESSONS* about how one becomes a test pilot under various scenarios, it reminded me of a tip my dad gave me many years ago. Anytime you have question about a plane's ability to fly, the best answer is to not go. Always remember the old flying axiom, "It's better to be on the ground wishing you were in the air, than to be in the air wishing you were on the ground."

However, if you've had some routine maintenance done or have the slightest question about the plane, I ask tower for permission to accomplish a climb directly over the field in a gradual race-track pattern, remaining within gliding distance to the runway at all times. Most controllers are understanding and will approve your request. At uncontrolled airports do the same, just announce your intentions over the radio.

Good advice, Richard. That's what I did back when I flew production test on turbonormalized engine modifications. Thanks.

Share safer skies. Forward *FLYING LESSONS* to a friend.

Aviation Human Factors & Safety Management System

Seminar III: Real-World Flight Operations and Research Progress

Dallas, Texas (Love Field)

Tuesday March 29 - Wednesday March 30, 2011

The third annual interactive seminar to discuss research issues, academic challenges, and system advances for human factors and safety management systems in the real-world of operations. The goal is to meet and share information cutting across operational domains: Part 91, 121, 135, 141 and 142, 147, fixed-wing and rotorcraft. 16 phenomenal speakers will discuss operational lessons learned and research progress. Attendees will have an opportunity to discuss their concerns and needs for human factors tools and safety system solutions. Come join a great venue for two days of professional networking! See Kent Lewis' [Signal Charlie website](http://www.signalcharlie.net) for more information and to register.

See www.signalcharlie.net/Seminar+2011.

Night...Circling...Fog

Paralleling last week's *FLYING LESSONS* on "taking a look" in poor weather with a clear escape plan, AOPA's Air Safety Institute has posted an [accident analysis](#) of a Piper Twin Comanche's wings-level descent into water (written by ASI's David Kenny, a long-time *FLYING LESSONS* reader).

See www.aopa.org/asf/epilot_acc/cen10fa070.html?WT.mc_id=101217epilot&WT.mc_sect=sap

All in one iBasket

NASA's Aviation Safety Reporting System (ASRS) has this week published an [Alert Bulletin](#) advising pilots not to depend on Apple's iPad as a sole-source of inflight en route or approach charts, and/or in-flight position awareness. The Bulletin relates pilot reports (one each) of improper position awareness that contributed to an unauthorized Class C and Class D airspace entry, and of an inflight iPad overheat condition that left the pilot airborne without required navigation charts.

It seems that all technology has its limitations. It's our job as pilot-in-command to use multiple sources of information in flight to maintain position awareness. One of those sources should be a good mental picture of our position at all times that is independent of a moving map or any one other technology. I think one of the hardest things to teach an IFR pilot is how to see themselves as a controller sees us, one of many moving targets aloft in a world of weather and terrain conflicts. I fear that the superb addition of moving maps over the last decade or so has pushed this vital mental skill so far back in the priorities of teaching that many instructors don't know how to teach this to students—or that it's necessary to teach it at all. That leaves us completely lost if the moving map goes down for any reason, and gives us no skills to critically evaluate whether the geo-referenced airplane symbol on the moving map display is truly depicting our position.

Another source is a back-up of at least the very basic paper charts for your flight: sectionals, en routes, terminal areas and instrument approach procedure charts as required for your flight.

Writes the pilot who made the airspace bust while watching position information on his iPad:

Normally I don't rely "solely" on moving map information for avoiding some types of airspace. Clearly this was an amateur's mistake on my part...it's clear that scaling the moving map changes the geographical position of the airplane displayed on the moving map, despite the GPS engine providing accuracy within +/- five meters. [After some investigation the reporter] believes the degradation in position location was associated with the lack of an external antenna. He believes refreshing property was limited to the last known position, which accounted for the lag in location information, thus the airspace incursions.

Reports the pilot who submitted his experience about an inflight overheat that left him without navigation charts:

Certified electronic flight bags are presumably designed for a wider range of cockpit environments than much cheaper consumer products like the iPad; pilots are encouraged not to rely on such consumer devices, but I think this particular failure should be more widely communicated. Despite being a professional electrical engineer, I certainly did not anticipate it...The software's authors do not recommend it for use for navigation, but pilots may do so anyway.

iPad overheats when exposed to direct sunlight are fairly common, according to online user groups.

See www.mastery-flight-training.com/nasa_ipad_warning.pdf

Angle of Attack



Recently *FLYING LESSONS* has focused on the concept of angle of attack to get maximum performance and avoid mishaps. Shortly before press time I benefited from the generosity of reader Charles Lloyd, a retired Cessna Citation/Caravan salesman and NetJets captain, who flew to Wichita in his Cessna 182J to give me some left-seat experience using the [Alpha Systems](#) angle of attack indicator. I quickly found using the AoA easier and vastly superior to flying by reference to the airspeed indicator—my lack of recent experience in Cessna 182s made maximum performance even easier for me using AoA. I'll be writing more about my AoA experience, linking to some of Charles' writings on the topic, exploring different displays and options, and maybe making you an AoA enthusiast too...in upcoming issues of *FLYING LESSONS*. Thanks, Charles!

See www.alphasystemsaoa.com.

Fly safe, and have fun!

Thomas P. Turner, M.S. Aviation Safety, MCFI
2010 National FAA Safety Team Representative of the Year
2008 FAA Central Region CFI of the Year



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